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Snow sampling studies in the  
vicinity of the Abitibi-Price  
pulp and paper mill in Iroquois  
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February, 1982.

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Snow Sampling Studies in the Vicinity of the  
Abitibi-Price Pulp and Paper Mill in  
Iroquois Falls

February, 1982

Prepared by

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## Snow Sampling Study at Iroquois Falls, 1982

### Introduction

A previous study (1975) had indicated that a zone of contamination of snow was present in the vicinity of the Abitibi-Price Pulp and Paper Mill located in Iroquois Falls. The contamination zone was usually confined within an 800 m radius of the paper mill and involved slightly elevated concentrations of calcium, sodium, chloride, sulphate, iron and aluminum in the snow samples.

In recent years, several alterations have been made to the process and equipment used in the operations of the mill. To determine if any problems with the operation of a new recovery boiler could be demonstrated, a collection of snow samples was requested by the Timmins District Office in Timmins. This report is a summary of data obtained in that investigation.

### Sample Collection

A collection of snow samples was made on February 8, 1982 at three locations in the vicinity of the mill. These locations correspond to established vegetation and soil sampling stations and are shown in Figure 1. The location of these stations with respect to the mill are as follows:

Site	Distance and Direction
3	200 m WSW
4	900 m W
7	250 m NNE

At each sample location, duplicate samples of snow were collected. The samples consisted of circular cores of snow, 7.5 cm in diameter and represented a complete profile of the snow from the surface to the ground level. The sample was taken in such a manner as to avoid contamination by ground materials. The number of cores required to fill 4.5 kg polyethylene bags was recorded. At the time of sampling, the total depth of snow was recorded as well as depth of fresh snow and the number of crust layers. Notes were made on the number and type of any banding or layering in the snow profile.

The samples were returned to the laboratory and allowed to melt overnight at room temperature in the polyethylene bags. The volume of snow melt-water was measured and a pH measurement taken immediately. The presence of black precipitate in the melt-water was noted and rated on an arbitrary scale of none to heavy. The samples were forwarded to the M.O.E. laboratory at Resources Road, Toronto and analyzed for the sulphate, sodium, chloride, total particulate, particulate total carbon, dissolved organic carbon and dissolved inorganic carbon content following consultation with laboratory staff.

## Results

The condition and depth measurements of the snow samples are shown in Table 1. Snow depth ranged from 57 to 78 cm. Two faint bands were observed in each snow profile. Fine black particulate in small amounts was observed in all samples. The greatest amount of particulate was observed in samples from Site 7 and least at Site 4 but the total amount in any sample was not conspicuous.

The analytical test results are presented in Table 2. The concentrations of sulphate, particulate, particulate total carbon, dissolved organic and dissolved inorganic carbon are all highest at Site 7 and lowest at Site 4. This suggests a gradient of these materials away from the mill. Further, examination of the data also shows that the particulate carbon makes up a similar and significant portion (31 - 40% of the total particulate) in each of the samples. Although there is an apparent gradient in these materials away from the mill, there is also a possibility that some of the contamination could originate with local fireplace and wood burning units for home heating. It would be difficult to sort out the relative contributions to the particulate carbon concentration of each of these sources without a specific material which can be used as a "tracer" of emissions from the mill boiler.

## Conclusions

The Ministry of the Environment conducted a snow sampling survey in the vicinity of the Abitibi-Price Paper Mill at Iroquois Falls in February 1983. Although small amounts of contaminants were found in samples collected in close proximity to the mill, it was not possible to demonstrate any problems which could be directly attributed to recent operational changes at the mill. Due to the inherent problems in snow sampling (time of exposure and dilution by freshly fallen snow), it is of limited value to apply the snow sampling technique to document and define the environmental impact of the recovery boiler at the paper mill. An alternative method is needed to evaluate any emissions from the paper mill.

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Table 1: Condition and Depth of Snow Samples Collected in the Vicinity of Abitibi-Price Paper Mill at Iroquois Falls, February, 1982.

	Site		
	3	4	7
Snow Depth (cm)	64	57	78
Crust Layers	0	1	1
Banding	2 faint	2 faint	2 faint
Particulate in melt water	light, black particles	trace to light fine black particles + birch seeds	light to moderate fine black particles

Table 2: Analytical Test Results for Snow Samples Collected in the Vicinity of the Abitibi-Price Paper Mill at Iroquois Falls, February, 1982.

Element (mg/L)	Site		
	Site 3	Site 4	Site 7
SO <sub>4</sub>	1.5	1.1	2.0
Na	1	1	1
Cl	1.28	.65	.55
Particulate	8.	5.5	14.5
Particulate Total Carbon	3.2	1.7	5.9
Dissolved Organic Carbon	1.3	.7	1.6
Dissolved Inorganic Carbon	0.9	0.4	1.0
pH	6.1	4.5	5.7
Percent particulate carbon*	40	31	40

\*  $\frac{\text{Particulate total carbon}}{\text{Particulate}} \times 100\%$



Table 3: Concentrations of Selected Elements in Snow Samples  
Collected in the Vicinity of the Abitibi-Price Pulp and  
Paper Mill at Iroquois Falls, 1975-1982.

Sample Location	Collection Date	Test			
		SO <sub>4</sub> mg/L	Na mg/L	Cl mg/L	pH
3	Jan. 1975	6.1	1.7	0.6	4.6
	Feb. 1975	1.2	2.3	2.8	-
	Jan. 1976*	0.8	0.1	0.9	4.8
	Feb. 1982	1.5	1.0	1.3	6.1
4	Jan. 1975	1.6	0.4	0.5	5.0
	Feb. 1975	2.1	3.0	3.5	-
	Jan. 1976	0.9	1.0	2.6	4.7
	Feb. 1982	1.1	1.0	0.7	4.5
7	Jan. 1975	5.4	0.3	1.1	5.3
	Feb. 1975	1.4	2.4	2.5	-
	Jan. 1976	0.9	0.2	1.2	4.5
	Feb. 1982	2.0	1.0	0.6	5.7

\* In 1976, mill was not operating due to labour strike.

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